

REMARKS

Claims 1-12 and 14-18 are pending.

Claims 1-12 and 14-18 are rejected.

Claim 1 is amended.

Amended Claim 1

Claim 1 is amended to require that the polymer formed exhibits an intrinsic viscosity of at least 3 dl/g.

Support for this amendment may be found on page 13, lines 10-13.

Claims 1-12 and 14-18 are rejected under 35 USC 103(a) as obvious over Yamada, US 5,334,519 in view of Seki, US 5,352,828 and Leonova, Biotechnology, 1000, 88:231-241.

Examiner states that in the process of Yamada after the substrate is converted into a monomer, it contains cellular material and/or components. However Examiner agrees that Yamada does not teach the formation of a polymer in the vessel comprising the ethylenically unsaturated monomer wherein the unsaturated monomer comprises cellular material and/or components of the fermentation broth.

However, Seki teaches that solutions of acrylamide will occur under most conditions, such as in the presence of iron. Thus according to the Examiner it is either inherent to the teachings of Yamada, or polymerization would occur during routine optimization and experimentation, that polymerization of the fermentation broth would occur.

Applicants disagree with the examiner's analysis.

As discusses in the present disclosure on page 4, lines 11-24:

"It is standard practice to remove the biocatalytic cells from the growth medium before using the biomass to produce the monomers in order to avoid contamination of the monomer by impurities that could adversely affect the successful polymerization of the monomer. It is generally accepted that even small quantities of impurities can affect the polymerization of monomers or prevent polymerization taking place at all. For instance initiating systems used for polymerization are used in tiny amounts and therefore it would require only small amounts of impurities to inactivate them, stopping or short-stopping the polymerization. Such impurities may result in branching , cross-linking, chain termination or other effects on the polymer."

There is no suggestion whatsoever in any of the references cited by the examiner to polymerize a monomer formed by a biocatalysed reaction or fermentation process in the presence of the cellular

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material and/or components or a fermentation broth. In fact, Yamada teaches that No polymerization takes place as the monomer is produced in 100% yield (example 4).

As explained in the present disclosure it is generally accepted that elimination of the purification step would not work because the presence of even small quantities of impurities would affect the polymerization.

The surprising aspect of the present invention is the fact that polymerization occurs without adverse effects on the polymer per se. This is clearly shown in the comparisons run in the examples wherein a polymer formed from a monomer formed by biocatalysis which is not separated from its fermentation broth performs as well as that which is centrifuged from fermentation broth. See Tables 2 and 3 on page 19.

Thus the applicants are the first to understand that the removal of the cellular material and/or components of a fermentation broth need not take place before polymerization. The formed polymer performs as well as the monomer subjected to the purification step.

The applicants bring to the examiner's attention that the inherency of a process and its obviousness are different questions; that which may be inherent is not necessarily known; obviousness cannot be predicated on what is unknown.

The Examiner has failed to consider the invention as a whole. That is the process of the invention eliminates a purification step, previously considered necessary. The result is a product of surprising viscosity and performance. Claim 1 has been so amended to reflect the viscosity.

The issue here is not whether polymerization might have occurred or might not have occurred in the experimentation of Yamada (and Yamada specifically states it did not occur, while the Examiner believes that because of the teachings of Seki it was likely to occur). Part of the problem with the Examiner's rejection is he has given an obviousness rejection based on inherency. If an obviousness rejection is based on inherency, the unexpected property of the present process (production of flocculants of relatively high viscosity which perform well without the purification step) could only inhere in a post-invention rationalization, which is at most a possibility and not a proper basis for obviousness.

Further the examiner has failed to consider the invention as a whole. Yamada never suggested the polymerization of the monomer formed by biocatalysis without a purification step. Examiner believes the experimentation run in Yamada would have likely resulted in polymerization because of the statements of Seki. However, Yamada states no polymerization took place. But the fact is the present claimed process eliminates a separation step, which no one skilled in the art recognized could have been eliminated and still achieve a product of high quality (high viscosity and good performance as a flocculant).

Even if polymerization might occur in the experiments of Yamada (and applicants believe this to not be the case because Yamada states no polymerization took place), this spontaneous polymerization would not lead to a polymer of the desired quality. See col. 5, lines 14-21 of Seki where a popcorn-like polymer is produced.

Reconsideration and withdrawal of the rejection of claims 1-12 and 14-18 is respectfully solicited in light of the remarks and amendments *supra*.

Since there are no other grounds of objection or rejection, passage of this application to issue with claims 1-12 and 14-18 is earnestly solicited.

Applicants submit that the present application is in condition for allowance. In the event that minor amendments will further prosecution, Applicants request that the examiner contact the undersigned representative.

Respectfully submitted,



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